

National Board of Health to which their execution might be entrusted. There can be little doubt of their necessity, or of their success in eventually exterminating the disease. When this necessity becomes more apparent this result will be immensely more difficult of accomplishment. These measures should be—the establishment of graded hospitals in possibly insular localities in various parts of the country, to which all access should be prevented excepting under restrictions determined by professional rules; the enactment of laws which should make residence compulsory and perpetual, and the concealment of the disease punishable by severe penalties. These rules should apply to so-called sporadic as well as to endemic and imported cases, but the latter might be given the option of returning to their native land. The immigration of lepers should be prohibited and arrested at ports of arrival by inspection so far as possible, as other contagious diseases now are by quarantine regulations. By the establishment of such national measures immigration from leprous countries would largely cease, lepers would no longer change their residence within the country to escape the action of local laws against their liberty; marriage with them would become abhorrent when the people had thus become aware of its dangers, and after a generation has passed the disease should be virtually eradicated.

But are such measures justifiable? it will be asked; why not so, as much as the national laws concerning yellow fever, and municipal regulations against smallpox? These kill their victims quickly and intermittently, leprosy after years of frightful disfigurement and pauperism. If we cannot prevent our country from becoming the refuge of the world's criminals, we may at least take such action that it shall not be made the asylum for its infectious diseases. If Draconian laws regarding marriage and intercourse could stamp out consumption and syphilis, as some day they will, who would feel that he had a right to oppose them? Lepers belong to the dangerous classes of the community which require perpetual confinement, and the sooner this remedy is applied the less seeming cruelty will attach to it.

9a.

ARTICLE XII.

SALIENT POINTS IN WHICH EYE DISEASES MAY HELP OR MISLEAD THE GENERAL PRACTITIONER IN DIAGNOSIS. By WILLIAM C. AYRES, M.D., New York, Assistant Surgeon to the New York Ophthalmic and Aural Institute, Assistant to the Chair of Ophthalmology in the Medical Department of the University of the City of New York.

IT cannot be denied that ophthalmology is one of the most advanced of all the branches of medical science; and considering the intimate relation of all parts of that wonderful structure of the human system, we would

naturally expect to find that a knowledge of eye diseases would be of material assistance in enabling the general practitioner to arrive at a correct diagnosis of disease processes in localities far remote from the organ of vision. In fact we find it so. Therefore in the following pages we will call attention to some of the salient points in which eye symptoms can aid in general diagnosis and prognosis.

I. INTERNAL EYE DISEASES, OR THOSE DETECTED WITH THE OPHTHALMOSCOPE.

Meningitis.—I know of no symptom which could possibly afford more pleasure to the doctor and the friends than that which says: "the patient, who has been suffering from a meningitis, is commencing to improve." This is the direct answer which the ophthalmoscope gives us, on examining the retina and optic nerve entrance in the background of the eye, when such an improvement commences.

As an illustration we will take that type of brain trouble, which results from a continuation of a mastoiditis to the cerebral contents; since such a meningitis does not differ to any great extent from other brain processes, as far as the eye symptoms are concerned.

In very recent literature, Prof. Zaufal, of Vienna, writes: that in ear diseases, an ophthalmoscopic examination is indispensable, as an indication of the necessity of trepanation of the mastoid process, since an appearance of inflammation at the optic nerve entrance into the eye, warns us that there has been a continuation of the disease in the mastoid cells, or tympanic cavity to the brain—either in the shape of a meningitis or thrombosis of the cerebral sinuses. The ocular manifestation is very easily recognized with the ophthalmoscope.

The nicely of this method of examination consists in the fact, that the optic neuritis or neuro-retinitis often warns us of a cerebral complication before any other meningeal symptom is pronounced. Also, when the meninges of the brain have become inflamed any change in the already established disease is most easily recognized in the background of the eye. Again, if the disease is on the increase, we observe a corresponding increase in the severity of the optic neuro-retinitis; and, if it is on the decrease, the first place to show it will be the retina and optic nerve.

To show how trustworthy the eye symptoms are, and how delicate and reliable the method of examination is, after a trepanation of the mastoid process for meningitis from ear disease, the eye next to the diseased ear is the first to improve if the patient is going to get well; later both eyes improve, the former improvement being almost immediate after the operation, the latter also in a very short time.

The reason why the eyes should be most carefully examined in diseases of the brain, is because the retina and optic nerve furnish the only nervous

expansion communicating directly with the cerebral contents which we can inspect.

If we remember the method of development of the retina and optic nerve from the very walls of the embryonic anterior cerebral vesicle, and keep in mind all the changes they go through until they result in the adult organ, we see that the retina and optic nerve have always been in direct continuation with the cerebral contents, and always remain so. Then, again, the dural and pial sheaths of the optic nerve are directly continuous with the dura and pia mater through the optic foramen; the lymph space contained between them is also continuous with the subdural space in the brain. Therefore, since the retina and optic nerve are integral parts of the brain, and since we can get a clear view of the one and not of the other, how very important the examination of the eye becomes when it affords us direct knowledge of what is going on in the brain, a part of the body which we cannot inspect (the examination of the optic nerve with the ophthalmoscope being so very easy).

Some of the diseases which we will consider as lending aid in general diagnosis or prognosis by the symptoms produced in the eye, require a certain dexterity with the ophthalmoscope, and we will consider that the reader has the requisite amount of practice to interpret the eye symptoms correctly.

The idea naturally suggests itself, that any one who is not very awkward, can gain sufficient dexterity with the ophthalmoscope in six weeks or two months, under a competent instructor, to make it an instrument in his own hands, more powerful in general diagnosis than any he has ever had before. And when a combination of circumstances will enable him to save the life of a patient by such knowledge, he will certainly not regret the few days spent in acquiring it. The ophthalmoscopic appearances of optic neuro-retinitis will be given later under the head of Bright's disease.

Alcohol and Tobacco Poisoning.—It may not be out of place to enumerate the local eye disturbances, and consequent diminution of sight brought about by the use of alcohol and tobacco, since they are so very easy of observation and so very important to the patient. A patient comes to a doctor and tells him his sight has been gradually failing for some time past, and wants to know what he shall do for it. If the physician looks into his eye with the ophthalmoscope (the external appearances are normal) and sees a paleness of the optic nerve entrance without any other marked objective symptom, he may question him at once if he is fond of alcohol or tobacco. In the majority of cases he will say that he partakes only to a limited extent, and this may or may not be the case, since the eye symptoms are often brought on by a very small quantity of such stimulants. The next examination will be made by taking a small piece of red or green paper and directing the patient to look directly

at it. If the failure of sight is caused by alcohol or tobacco poisoning, the colour of the paper will not be recognized. They cannot distinguish between red and green, and may call both gray. In advanced cases blue will not be recognized in the same way, but they generally know yellow (its complementary colour).

If they fail in these tests for central vision for small pieces of coloured paper, but recognize larger surfaces of the same colours, they have what is called "central colour blindness." If this be present, combined with paleness (atrophy) of the optic nerve, liquor and tobacco are at the bottom of the difficulty almost to a certainty. If the patient stops these stimulants *immediately*, and takes iodide of potash, his sight may return notwithstanding the atrophic appearance of the optic nerve; but, if not, he will certainly have ultimately to be led about the streets by some of his friends, as total blindness will be sure to follow.

The ophthalmoscope gives the doctor a direct means of diagnosticating this condition; and in fact almost the only means, since no one would think of examining the central colour perception first, although the central colour defect is the differential symptom, since atrophy of the nerve may be the result of many other causes.

Retinal Apoplexy.—In the same way when there are hemorrhages in the retina of an older person without any apparent cause, this symptom may lead us to expect a subsequent cerebral apoplexy. At any rate it will tend to put the doctor on his guard.

Leucocythaemia can always be first discovered by examining the retina with the ophthalmoscope, but since the disease is comparatively rare, space must make us refer the reader to some text-book on ophthalmology for the corresponding eye changes. The same may be said of *oxaluria, lead-poisoning*, etc.

Bright's Disease, as demonstrated in the eyes, holds a very important place in the series of affections under consideration. The changes in the eyes are so very characteristic, and I may say constant, that we may be sure, that when such appearances are found in the retina, we can diagnose the kidney disease even if there is no albumen in the urine.

The changes in the optic nerve and retina in this particular disease are very peculiar. First of all we may notice an optic neuritis, which does not differ to any great extent from any ordinary neuritis. The chief symptoms of an inflammation of the optic nerve, are swelling of the nerve where it enters the eye (optic disk or papilla), and a certain continuation of such swelling over to the adjacent parts of the retina. By this condition the contour of the nerve is rendered blurred, and the nerve looks puffy (choked disk). In the normal eye, the optic disk is sharply defined, being more or less elliptical in shape, on account of its oblique entrance into the eye, or rather from the fact that we look at it obliquely. The

nerve itself may be likened to a cylinder; but as all oblique sections or projection of the cylinder are ellipses, the contour of the disk has the latter shape.

Besides the ordinary form of optic neuritis we see in Bright's disease, we may notice numerous small hemorrhages in the retina; these are probably the result of a complication of the walls of the bloodvessels, and congestion from the concomitant inflammation. These two symptoms are, however, not alone pathognomonic of albuminuria. But when we find them in connection with a *system of white dots* or spots, arranged around the yellow spot (macula lutea), and the point of distinct vision (fovea centralis), like the rays of a star, we may safely make the diagnosis of Bright's disease of the kidney, even if we do not find albumen in the urine on testing it in the usual way with heat and nitric acid.

I remember such a case in the practice of one of our most celebrated oculists, in which the patient had simply come to him to have his eyes tested for glasses, since he did not see quite well. The doctor was unable to bring his vision up to the normal by any simple glass or combination of glasses. On examining the background of the eye with the ophthalmoscope (and from this examination alone) he diagnosticated kidney disease. The family physician was told that such was the case, when he examined the urine, but found no albumen or other abnormal constituent. He, therefore, discredited the diagnosis, and told the patient that he was a perfectly healthy man. The peculiarity of the case was, that the condition of his eyes went on without treatment for eight to nine months; but after that time, albumen began to appear in the urine, and the man died in about one year ultimate to the first detection of albumen, having had his kidney trouble for full two years or more.

Many such cases are met with, and I may say are so much the more important, since it may be that an energetic treatment may ward off the usual result, or even cure the affection; and we are able to do this simply by virtue of the fact that its existence was *made known in time* through an ophthalmoscopic examination of the region of the yellow spot. There are various other changes in the retina in albuminurea, but the above is sufficient to detect its presence.

If anything could possibly suggest the value of eye symptoms in making a diagnosis of a disease far remote from the organ of vision, this is certainly one.

The eye symptoms also point out the unsuspected presence of albumen in the urine, which happens so often during or after pregnancy; and here too an ophthalmoscopic examination is invaluable to the general practitioner of medicine.

Let us follow a little further those systemic diseases in which the background of the eyes reveal to us conditions which no other part of the body is capable of doing.

Effects of Medical Agents given for Systemic Diseases; Quinine.—Suppose, for instance, that a patient to whom the doctor has been administering large doses of quinine, comes and says she cannot see as well as she used to (this would only be in a very light case of quinine poisoning). The ophthalmoscope is used, and the optic disk is seen to be pale, the arteries small, and the rest of the eye apparently normal. If we then examine the field of vision (*viz.*, how much the patient can see with the peripheric portions of the retina, the most convenient way to examine which we will mention later), and find that the eye is blind except in a small horizontal zone, or that the visual field is very much constricted, the doctor is at once admonished by such a condition that his patient is being poisoned by the drug he has been administering. He will also know that if the quinine is continued the patient will become totally blind and deaf.

Quinine amaurosis, as it is called, or loss of sight from quinine, has been long known to oculists both in this country and in Europe, but its exact nature has been investigated only of late years by Roosa, Knapp, Grunning, Michel, Hobby, Weeker, Voorhies, and others (their articles having been published mainly in the *Archives of Ophthalmology*). At present it is a general affection which every doctor, and especially those in malarial districts, should be able to recognize by the eye symptoms alone, since, if he does not, he may do his patient an irreparable injury.

The effects of the disease on the eyes may be learned from a case recently published by Knapp; and since he has summed it up nicely we will insert it. He writes:—

"On February 16, 1878, the seven-year-old daughter of M. L., of New York, was brought to my office on account of an impairment of vision. I learned from the mother that the child three months previously had been suddenly taken sick in the afternoon with high fever, nausea, vomiting, and restlessness, but no spasms. She groaned frequently, and was delirious for twenty-four hours. She was treated by Drs. Simmons and Whitall, and took a great deal of quinine. On the sixth day she became hard of hearing, and for four days she could not see anything; the pupils were immovable. She recovered from her general disease in two weeks, but her sight had remained weak, and she felt uncertain on walking.

"When she presented herself she was in good general health. Sight normal, but she showed a concentric limitation of her field of vision in both eyes. Her colour perception was normal. The ophthalmoscope showed a striking picture: *both optic disks white; the retinal vessels scant and very small, especially the arteries; the pupils were of normal size and mobility, and the eyeballs of normal tension, showing nothing unusual in external appearances and mobility.*"

While this may be called a typical case as far as it goes, it is by no means one of the worst kind, since the blindness may be total, and last for months. In fact it may take a couple of years before the sight is restored to the normal standard, and the contraction of the visual field may be permanent. The prognosis, as far as the return of central vision is concerned, is very good.

Knapp sums up the eye symptoms as follows: 1, diminution of the colour sense; 2, diminution of the light sense; 3, pupils irresponsive to light

during the total blindness; 4, anaesthesia of the cornea. He mentions again as a 5th symptom, impairment of hearing reaching to total deafness.

Thus we see that the eyes are the only conspicuous organs which intimate to us that great damage is being done or has already been done by this drug; and, when a physician has once become cognizant of the deleterious effect of the medication, if he has not stopped it long before, he will certainly do so immediately, and never give the same patient large doses of quinine again.

Salicylic acid may produce the same effect as quinine when it happens to be given to a patient whose personal idiosyncrasies forbid it, but such persons are by far less numerous than those who cannot tolerate quinine.

That it is really the quinine or salicylic acid which does the damage, and not the diseases for which they are given, may be concluded from the experiments of Kirehner in Würzburg. He gave animals 1-3 grammes of these drugs, and found after a lapse of three or four days, on post-mortem examination, that there were hyperæmia and hemorrhages in the tympanic cavity (middle ear). Also, in the labyrinth. Numerous hyperæmic conditions with reddish colouring of the endo- and perilymph existed. He did not state whether he examined the eyes or not; but pathological conditions can certainly be suspected in these organs *a priori*, in connection with the ear lesions.

The foregoing ought certainly to be enough to demonstrate the importance of the condition of the eyes to the general practitioner, in quinine and salicylic acid poisoning. So much for the ophthalmoscope. While there are many other conditions of importance which are furnished us by this instrument, we will let the above suffice for our purpose, and pass on to other diseases where we need the help of no instrument.

II.—THE RELATION OF EXTERNAL EYE DISEASES TO THE GENERAL SYSTEM, OR WHERE THE DIAGNOSIS CAN BE MADE WITHOUT INSTRUMENTS.

Locations of tumours, exudations, clots, etc., in the brain can easily be made in many instances from an examination of the eyes, if we keep in mind a few facts which we learn from anatomy. Such localizations are determined from an examination of the field of vision. For fear that such an examination may not be familiar to some, we will describe the simplest, as well as one of the best ways of making it, and also of recording it for future reference. Place the patient near a blackboard on the wall (say eighteen inches or two feet away) and direct him to look steadily at a chalk mark which will be made on the board in front of him. Only the eye which is to be examined should be allowed to remain open; close the other by placing a pocket-handkerchief over it. Take a piece of white chalk, and approach it from the periphery towards the spot which he was

directed to look at, and request him to say when he first sees it. As soon as he does, make a mark on the board with the chalk. In the same way, bring it from above, from below, the right, the left, and all intermediate directions, making a mark at the moment the chalk comes into view. If we now draw a line through all of the points thus formed, this line will map out the periphery of the field of vision of the eye examined. Examine the other eye in the same way, since only the conditions of the two eyes when taken together will enable us to locate a lesion in the brain.

The first anatomical point to be remembered is that in all animals having what is termed binocular fixation, or, that can direct both of their eyes to the same point at the same time, there is a more or less complete semi-decussation of the optic nerve fibres at the optic chiasm in the region of the sella turcica at the base of the brain. The second point is that in semi-decussation, the decussating fibres form the inner half of each optic nerve tract. As a direct result of this, we find that the nasal half of each retina is supplied by decussating fibres up to a vertical line running through the points of distinct vision, the foveæ centrales. The third and only remaining point to be remembered is that we see an object on our right side with the left side of the retina and on the left side with the right side of the retina.

To locate a brain lesion by means of the defects it produces in the field or fields of vision, suppose, for instance, that we examine a patient in whom we suspect such a brain trouble and find that the nasal side of his right retina is blind, that is, he does not see the chalk on the right side. In the same way on examining the left eye, the temporal half of the retina is found to be blind. The only possible place for the lesion would be in the left hemisphere, and behind the chiasm.

The reason of this is to be readily explained, viz., since only the nasal side of the right eye is blind, and the optic nerve fibres which supply the nasal sides of the retina always decussate, only the decussating nerve fibres of this eye are affected and consequently the lesion must be on the other, or left side of the brain. When we examined the left eye, we found that only the temporal half of the retina was blind, and since this half is supplied by optic nerve fibres which do not decussate, the lesion must also be on the left side of the brain, which agrees with the examination of the other eye.

If both eyes are totally blind the lesion will be most probably found to have destroyed the optic chiasm, or so extensive as to have involved the whole base of the brain.

If only one eye is totally blind the lesion must be in front of the chiasm for obvious reasons.

There is one very peculiar condition in the brain which leads to such defects in the field of vision as would be quite difficult to explain, unless

attention was directed to a certain anatomical arrangement of the blood-vessels in the circle of Willis. Suppose a patient was blind in both outer halves of his retinae—the temporal of the right and also the temporal of the left eye. We know that these outer halves are supplied by optic nerve-fibres which do not decussate, and therefore to make both of these halves blind at the same time there must be compression on the outer parts of each optic nerve tract. Such a lesion could not be *behind* the chiasm, for if it affected both optic nerves there, both eyes would be totally blind. It could not be *in front* of the chiasm for the same reason.

It must, therefore, *be at the chiasm*. We find such a condition in an atheromatous degeneration of the walls of the bloodvessels which form the circle of Willis, a circumstance which was first pointed out by Dr. Knapp, of New York.

There is another very peculiar defect in the fields of vision possible, where both *nasal halves* of the retinae are made blind. This too must come from a lesion at the chiasm, but *between the optic nerves*, since only at this place do we find the nerve tracts close enough together to be affected by a tumour, unless it involves an extensive area. If we remember that the infundibulum passes in between the nerves at this place, and the tuber-cinereum is close at hand, we easily recognize that any tumefaction of these tissues may render the fibres of the inner halves of each optic nerve incapable of transmitting impressions to the brain, and the corresponding halves of the retina will be blind.

Ranney has made a diagram in his “Applied Anatomy of the Nervous System,” which may be of assistance in the above localizations. While it is not exactly correct in details, it is still serviceable. It is only intended, however, to be diagrammatic.

While we have the study of the visual fields under consideration we may mention some other diseases which produce peculiar defects.

Atrophy of the optic nerve produces a concentric limitation of the visual field in the periphery, with the peculiarity that the boundary line is very irregular or zigzag.

Retinitis pigmentosa, or pigmented degeneration of the outer layers of the retinae, produces a peripheric concentric limitation, with a very regular boundary. In advanced cases vision is limited to a very small central part of the retina, and after this total blindness occurs. It is a progressive disease usually found in children where there has been a too close inter-marriage of their parents. These patients generally have pigment spots in the retina which resemble the shape of a bone corpuscle. They also complain of not being able to see at all after sunset (night blindness). This symptom, taken in connection with the peculiar visual field, is sufficient to diagnosticate the disease even if there is no pigment to be seen in the retina. No treatment will cure it.

Glaucoma produces a defect in the visual field on one side, but later it may resemble that of retinitis pigmentosa. In this condition there is generally a deep excavation of the optic nerve entrance, and the patients do not complain of night blindness. This disease is nearly always curable by an iridectomy or a sclerotomy, provided the operation is done early enough. Every doctor ought to be able to do this one eye operation, since it may be that his patient cannot reach a specialist until it is too late to do him any good. As a further indication of this disease we all know that the eyeball is very hard, and the cornea is anaesthetic. Acute glaucoma is sometimes cured by dropping a one per cent. solution of eserine into the eye. We may mention that there are two kinds of glaucoma in which an operation should seldom be undertaken, viz., 1, glaucoma in very young people; and, 2, where there are hemorrhages in the retina—"hemorrhagic glaucoma." The defect in the field of vision is also progressive in this disease.

Detachment of the retina produces a defect in the visual field corresponding in shape to the extent of the retinal detachment.

Embolism of one of the lower branches of the central artery of the retina will produce a defect in the visual field over the whole extent of retina supplied by such artery.

Exudations and *atrophic spots* in the choroid may produce defect in the field of vision corresponding to their situation. These are generally stationary, unless the exudation gravitates.

Disturbances of circulation in the brain may produce a peculiar defect in the visual field. It is generally on one side of the retina; commences at the centre and gradually passes towards the periphery; lasting from a few minutes to a few hours. The boundary of this defect is coloured like a rainbow. After it passes off (since it is only temporary) an intense headache generally sets in, lasting for several hours. There is no distinct brain lesion in connection with this form of defect, nor is there any known medication that will control it.

There are various causes which may produce local defects, such as a *coloboma* (congenital defect) in the lower part of the retina and choroid; but all of these are more or less stationary.

As a general rule we may say that those diseases which produce blindness in the periphery of the field of vision are progressive, and the blindness will become total; whereas if the defect is central, that is, in the posterior parts of the retina only, there is no reason why it should ever increase to any alarming extent. A knowledge of this latter fact always affords the greatest comfort to the patient.

Prof. O. Becker, of Heidelberg, in summing up an extensive treatise on the relation of eye troubles to the localization of cerebral disease states:—

" 1. In cerebral disease, the eye affection is always on both sides. 2. Optic neuritis, or neuro-retinitis, alone does not prove the existence of central disease. 3. In primary atrophy (of the optic nerve) we can recognize its tabetic nature by the shape of the visual field. 4. In hemianopsia (blindness of one-half of the retina, or the condition which we have just been considering) we can also, without atrophy, accurately localize the central lesion. 5. There are visual centres in the cortex of both occipital lobes. 6. We obtain important clews for localization by closely studying the muscle symptoms."

As an instance of localization from the muscle symptoms we may refer to Wernicke's case (*Archiv. of Ophth.*) viz., a tumour in the brain with symptoms of paralysis of the right abducens, and paralysis of the left internal rectus muscles. Double-sided optic neuritis, sight normal (?). Later paresis of the left abducens and right internal rectus muscles (paresis of the associated lateral movement). Cured by 6 grammes doses of iodide of potash.

From anatomical considerations, readily at hand, the diagnosis must be gummy tumour of the pons.

So much for the visual field. The ease and rapidity with which localization of tumours in the brain are affected, depend, not upon the conditions of the eyes, since these are well defined, but rather upon the personal equation of the examiner.

Diabetes.—If we find a cataract in the eyes of young people, whose origin cannot be traced to an injury, we must always examine the urine, since diabetes is most frequently the cause of such eye troubles. The cataract develops rapidly, and is of a whitish colour. It is also soft. This disease produces other eye troubles which we need not mention here.

Intra-ocular Tumours.—While we are considering tumours we may as well look into what local intra-ocular tumours teach us in general medicine. I refer to the various forms of intra-ocular sarcomata, since this is the only kind of cancerous growth that happens within the eye. In past years pathologists have claimed a peculiar nature for the tumour known as glioma of the retina, but to-day we consider it as simply a sarcoma of the connective tissue of nerves. This kind of sarcoma and sarcoma of some part of the uveal tract (iris, ciliary body, and choroid) are all that will interest the general practitioner; in fact, they are the only true tumours which affect the inner parts of the eye, except occasionally myomata, gummatous affections, and a few other innocent local hypertrophic conditions. It is true that cysts of the various contents of the eye may happen, but they are nearly always of traumatic origin.

Sarcomata in the eye teach us this important fact. A fact, indeed, upon which too much stress cannot be placed, viz., that in the beginning cancers are purely local affections, and if they be removed by taking away the eyeball at once, they never return. Ophthalmology has done the important service of demonstrating conclusively the principle first laid down by Virchow, that all cancerous affections of the body are first local affec-

tions, but afterward spread to the general system by the various processes of metastasis, direct continuation, etc.

The only point to be observed in the diagnosis of one of these intra-ocular cancers is to notice that there is some abnormal growth in the background of the eye, and then watch the ocular tension, viz., whether the eye gets hard or soft. To a person not particularly skilled in eye examinations an extensive detachment of the retina from the choroid may resemble a sarcoma of the retina (*glioma*) since they are both more or less of a white colour. The distinction which any one can observe is that in retinal detachments the eyeball either remains of the same hardness as the other eye or gets softer, whereas, a tumour of the retina makes the eyeball harder, or produces, sooner or later, what oculists call glaucomatous tension. A white sarcoma of the choroid will do the same thing; but since choroidal tumours occur in a tissue which is almost always of a dark colour from the choroidal pigment, they are generally reddish, brown or black. A further point in diagnosis between retinal and choroidal sarcoma is that the retinal variety always happens in children, whereas the choroidal variety generally occurs in adults. However, a distinctive diagnosis is of no great importance, since the treatment is the same in both. I would make a few suggestions as to what a physician should do when he meets with one of these tumours, since his action in the great majority of cases will determine the length of life of the patient.

If a sarcoma is not taken out with the entire eyeball (and that immediately) the cancer will most certainly pass into the bones of the orbit, and subsequently may affect the brain, liver, and the various other organs of the body, where it means certain death. If, on the contrary, the eyeball has been removed before the tumour has begun to spread, there is reason to believe that the disease is radically cured. The same may be said of sarcoma of the retina (*glioma*).

If the eyeball has been at once removed and the patient has gone on for *two years* without any symptoms of complication, he may be considered cured. If the disease comes back in the orbit the whole contents of this space must be taken away to the bone, with the hope that it has extended no further than the orbital contents. It is, however, a sad thing to see the disease reappearing in any part of the body after an attempt has been made to remove a choroidal sarcoma by extirpation of the eyeball.

Quite an amount of care and skill in diagnosis is requisite in this particular form of intra-ocular cancer.

There are a few cases of glioma of the retina or fungoid growth, as it is sometimes called, on record, which suppurated and cured themselves by perforating the eye continually, but they are very rare. The great majority of children suffering from this affection certainly die if the eyeball is not removed as quickly as possible after the diagnosis is made. They

either perforate the eye posteriorly and go into the orbit and thence to the bones of the skull and brain, or they are transmitted directly to the cerebral contents along the optic nerve, as in the case which I reported in the *Archives of Ophthalmology*, vol. x.

In both of these forms of cancer the anterior part of the eye is perfectly clear; attention being called to their existence only by examining the posterior parts of the eye, or by a peculiar brownish reflex in sarcoma melanoticum of the choroid, or a whitish one in white sarcoma of the same ocular coat or glioma (sarcoma) of the retina.

Tumours of the Orbit.—There are various other tumours which happen about the eye. As periosteal sarcoma of some of the bones of the orbit; adenoma or cylindroma of the lachrymal gland; ivory exostosis from the frontal sinus, etc.; but these make themselves known either by dislocating the eyeballs or by some prominence of their surrounding parts. These are not specially interesting to the general practitioner, although many of them produce death if not extirpated.

Pulsating Exophthalmus.—While we are speaking of tumours which affect the eye, we have still another to mention; the most peculiar and interesting of all. It is that which is known under the name of pulsating exophthalmus (protrusion of the eyeball).

There are about 125 such cases on record, and they all give a similar history. The typical condition is as follows: the patient comes to a doctor, with one, or sometimes both of his eyes protruding, and on palpation and auscultation there is a pulsation to be made out and a bruit to be heard in the eye, and over a certain area of the head surrounding it. Such patients almost always give a history of having had a fall on the head some time before, which produced the symptoms, at the time or later. *They are all traumatic.* The peculiarity of the condition consists in the fact, that notwithstanding the important eye symptoms, the disease has nothing to do with the eye, nor can any amount of eye treatment affect it in the least. All such conditions result from a rupture of the internal carotid into the cavernous sinus of the brain. As before remarked, only the eye on the side of the rupture is generally affected, but it sometimes happens that the other eye also becomes prominent and pulsates.

The only treatment which is rational in such cases is ligation of the common carotid on the injured side, and if this does not do away with the unpleasantness, ligation of both of the carotids (right and left sides). Sometimes even this does not do away with the disease, but it would be well, before undertaking these operations to try what the effect of ligation would be by pressing upon one or both of the arteries and listening if the bruit disappears or not. If it does, ligation is certainly desirable.

Sometimes we meet with a pulsating vascular tumour behind the eye, in the orbit, which is congenital, but is hardly to be mistaken for the

above exophthalmus. The proper treatment in such cases is to cut it out entirely. The operation offers some difficulties and should generally be done by a specialist of the highest standing, since a great amount of experience is required in operating behind the eye, to avoid cutting some of the muscles and nerves which are so numerous in this vicinity.

In the first kind of exophthalmus the eye symptoms may be almost the only ones which can point out the real condition of affairs. They point to a disease far remote from the eye itself, which can be cured in most cases by an operation which any surgeon can do. The eye symptoms become especially important to the general practitioner, since they lead him directly to the seat of rupture of the carotid into the cavernous sinus, and furthermore tell him how to cure his patient.

There has been a recent, very interesting, case of pulsating protrusion of the eyes (exophthalmus) published by Nieden, which certainly deserves to be mentioned here. A woman had had a fall on the back of her head in her fourth month of pregnancy. The fall did not affect her very greatly in any way at the time with the exception that she was unconscious for a day or so. At full term she was delivered of a healthy child, but just after this event her right eye began to protrude and then her left. The pulsation and noises in her head were not entirely done away with by compression of the common carotids in the neck, but they were very much improved. She and her husband were consequently shown how to make the compression with the finger,¹ and told to keep it up for several hours every day. The explanation of the case was that at the time of the fall the rupture was small, but the straining, concomitant with the process of labour, enlarged it and brought on the condition which we usually find in the beginning. Where such cases are met with in the practice of obstetrics the cause can be known from the foregoing.

Basedow's Disease.—Next in order comes the peculiar eye condition which is met with in Basedow's disease (*morbus Basedowii*). This too is a disease in which the eye symptoms may help the doctor very materially in his diagnosis, while the original disease has nothing to do with the eye, but is an affection of the heart.

The patient generally comes with both eyes protruding; but there is no pulsation or noise in the head. The eyes have a peculiar stare; and one of the striking conditions is that the lower lids do not cover the lower white parts of the eye (*visus horridus*). If the heart is examined in such a case, there will be a more or less conspicuous valvular lesion—the knowledge of which would be of great importance to the doctor in his treatment and prognosis.

¹ My friend, Dr. Corning, of this city, has recently written a monograph on compression of the carotids, and devised some very nice instruments for carrying it out.

The Pupils.—The conditions of the pupils sometimes speak volumes to the physician.¹ Conspicuous among the general diseases which their conditions show is tabes dorsalis. We all know that there are two centres for the action of the pupil, one which controls it in what is known as its accommodation action, and another which resides over its reaction to light. In tabes dorsalis, or sclerosis of the spinal cord, the light centre is affected, whereas that for accommodation remains free. Therefore when a bright light is thrown into the eye, the pupils are very small, but do not change their size in the least, as will constantly be the case when a bright light is thrown into the normal eye, however small the pupil may be already. If, on the contrary, we direct the patient to look at the end of our finger, and approach it close to the eye, the pupils will get smaller in tabes dorsalis, as they do in the normal eye. (This is called reaction to accommodation.)

Under this condition the pupils are known as Robertson's pupils, and when present, combined with loss of sexual appetite and weakness of the

¹ To show how important the size and conditions of the pupils are, we will quote from the quarterly report on ophthalmology in the *New York Medical Journal and Obstetrical Review*, July, 1881, p. 93, the following conclusions of Raehlmann :—

"1. If the illuminated pupil does not react to light, while the other pupil does, though not illuminated, the first optic nerve still retains its conducting power, and the failure of the pupil to react is due to a unilateral paralysis of the pupillary branch of the corresponding oculo-motorius, or to some affection of the iris. 2. If the pupil react to light, in spite of complete blindness, the cause of the latter is beyond the corpora-quadrigemina. 3. If both pupils react during convergence, both motor oculi nerves perform their function as regards the pupil. 4. If both pupils fail to react to light, either directly or sympathetically, while they contract during convergence, and if there is a certain amount of vision in both eyes, there is some obstruction to conduction in the fibres between the nucleus of the oculo-motorius and the tubercula quadrigemina. 5. In physically weak nervous persons and in maniacal patients very wide pupils are so often observed, that narrow pupils are regarded as an ominous symptom of approaching paralysis. A rhythmical change in the pupils is also observed in these cases, independent of the influx of light or of the act of convergence. 6. Narrow pupils are peculiar to all diseases which cause a diminution of the cortical function, especially paralytic dementia. 7. Myosis is especially frequent in diseases of the spinal cord and medulla oblongata; in tabes the narrow pupil is immovable to light, but reacts to convergence. 8. Irritation of the sympathetic in its peripheral course, or of its cervical gauglia, causes dilatation of the pupils. 9. Dilated pupils are a very characteristic symptom of impeded respiration from the action of carbonic acid upon the medulla. Contraction of the pupils shows that the highest degree of narcosis has been reached. 10. The pupils are dilated in pressure upon the brain, in brain tremors with choked disk, in chronic hydrocephalus, in hemorrhages within the cavity of the skull, and in simple distension of the cerebral vessels. 11. Difference in the size of the normally movable pupils points to an irregular innervation of the sympathetic, due to an irritation, either in its peripheral course or in the central connections in the brain and spinal cord. Mydriasis (wide pupil) of one eye, with movable pupil, is a suspicious symptom, pointing to a threatening brain disease, while without a movable pupil, it has no special significance."

grip of the hand, tabes dorsalis may be diagnosticated without the usual staggering gait. Here, again, the eye draws the attention of the general practitioner to a disease remote from it, which may be either cured or very much improved by appropriate treatment, whereas, if not so treated, grave consequences may be expected.

Syphilis.—There are various eye diseases which are brought about by syphilis, which may be the only symptom of the systemic contamination. The most conspicuous of these is a gummy tumour of the iris. If a patient comes with a part of his conjunctiva congested (the congestion occupying a band of this membrane extending from the margin of the cornea back around the eyeball), there are three conditions which may be looked for: 1, a foreign body in the cornea; 2, a small ulcer like a phlyctenular; 3, syphilitic iritis. Nos. 1 and 2 are easily detected by inspection, but if it is to turn out No. 3, in a little while a small yellow tumour or elevation will appear in the iris very close to the margin of the pupil. When such a tumour has made its appearance, even without any other symptom, we need not ask the patient if he has had a chancre, but *when* he had it. In fact we need not ask him any question at all, but simply put him or her under a vigorous mercurial treatment. Syphilitic iritis means energetic treatment, and the sooner the patient is brought under the effects of mercury the more damage we avoid. It does not make any difference whether he is salivated or not; but when salivation does happen it is often not the fault of the mercury but of the doctor. As the old saying goes, a gumma in the iris means "five minutes with Venus and five months with Mercury." It is a growing opinion in the profession that syphilis is radically curable. Be this as it may, syphilitic iritis is always curable under proper treatment. The recognized way of treating this form of eye disease is hypodermic injections of bichloride, combined with inunctions of blue ointment. Calomel, combined with a little opium, may also be used at the same time, and if the teeth are properly cleansed every hour with chlorate of potash there is no reason why salivation should occur. It is, however, better to stop treatment as soon as the peculiar mercurial odour of the breath is noticed.

Ocular Paresis.—There are a series of affections of the external muscles of the eye which are syphilitic in their nature. Paralysis or paresis is the general result. A paresis may come from a cold; but syphilis may also be suspected. If the patient has lost his hair just before the paresis, it looks very suspicious, and a little mercury may cure the muscular affection.

Just now another symptom occurs to me which might entirely mislead a doctor in his diagnosis. I refer to the position of the head in paresis of any one of the extra-ocular muscles. We know that it is very disagreeable to any one to have double images; viz., two images of one and the same

object. This always happens when one particular muscle of the eye is weak, when the physiological action of that muscle is necessary to bring the two eyes to bear on the same object at the same time.

A patient will try in every conceivable way to get rid of these double images by fusing them into one, and when he can do it by turning his head in any particular direction he soon learns to place his head in the proper position to accomplish his purpose.

If any of the external muscles are weakened by any cause, the person will turn his head in such a direction as will supply a certain loss of power of the weak muscle by the corresponding position of his head; that is, he will turn his chin in the direction of the line of action of the muscle which is suffering from paresis.¹ If the external rectus of his left eye is weak, he will turn his head toward the left side, so that he may shift the responsibility of single vision upon the internal rectus of the same eye, by making it do so much more work than it would have to do if the head was held in the usual direction, and the rectus externus muscle had to do the work of binocular fixation.

This may not be understood at first, but if we remember that the action of the left external rectus is to pull the eyeball directly outward, if we turn the head to the left, the optical axis is placed in the same position as it would have been had the head remained stationary and the eye moved.

Therefore, if a person walks with his head in any peculiar position, the particular ocular muscle towards which he turns his chin is weak. The chin is mentioned, since it covers the case of the oblique muscles also. The lameness may come from a tumour, it may come from a cold, but it is very frequently the result of syphilis, and a careful history should be arrived at.

Again, the eyebrows are a favourite place for gummy nodules to appear.

Inequality of the size of the pupils is also a result of syphilis in a large percentage of cases.

There is another form of eye trouble which may help the physician materially in diagnosis, viz:—

Specific Choroiditis.—A patient came to me some time ago, and complained that when he looked at anything there was a cloud before his eye which made everything dim. I looked into his eyes with the ophthalmoscope, and the only thing I could distinguish was that the picture of the background of the eye was not as sharply defined as it should be. The cornea, lens, and anterior part of the vitreous humour were perfectly clear, so the veil must have been in the posterior part of the vitreous. The retina seemed to be normal as far as could be made out through the opacity. On careful examination I could distinguish that the opacity was very finely punctated, and seemed to move about with the motions of the eye.

¹ Very nicely given in Ranney's "Applied Anatomy of the Nervous System," New York, 1881.

ball. I asked him if the veil of which he complained was fixed, or if it seemed to move when he moved his eyes. He told me that when he held his eyes steady for a time the veil was stationary, but when he suddenly moved them from this position the opacity followed like a cloud of dust, and passed the point at which he then fixed his gaze and banked itself up, as it were, to one side of his field of vision. I asked him if he had had syphilis, and he said he had not; but I was firmly convinced that he had. About a week or ten days after this there was a slight neuro-retinitis in his left eye, but none in his right. Some time after I had to treat him for an ordinary spongy iritis, when the diagnosis was certain, since the occurrence of spongy iritis (made known by a gelatinous exudation into the pupil and anterior chamber) never happens except after traumatic influences (operations, etc.) or constitutional syphilis. I told him that his eye was in no particular danger if he would submit to a severe treatment. Having put him in bed in a dark room, and given him mercurial inunction twice daily, combined with biniodide pills, to the extent of $\frac{1}{16}$ gr. three times daily, with atropine to be dropped into his eye every two hours, and leeches to his temple (since his pain was severe), he made a complete recovery from his eye trouble in the usual time of about six weeks.

Having often witnessed the good effects of an after-treatment of Zitmann's decoction, while resident surgeon at the New York Ophthalmic and Aural Institute, I ordered him to take one bottle of it every day for two weeks, and after that to take a mixed treatment of biniodide of mercury $\frac{3}{10}$ gr. and iodide of potash 10 grs. three times daily. Since then he has had no unpleasant symptoms.

Had it not been for the eyes no one would ever have known that he had been contaminated; for there was no other trace of specific disease about his whole body. It would have gone on until some of his vital organs would have become affected, which would certainly have been more dangerous to him than his eye disease. The case I have prepared more fully for publication elsewhere, since it presented other features which were more interesting to a specialist. I relate so much of it here, since the peculiar dust-like opacity in the vitreous was the only symptom about his whole system which could have led to a correct diagnosis; and it appeared some weeks before the spongy iritis. There must have been a slight neuro-retinitis or choroiditis at the time, but the opacity rendered its diagnosis very uncertain. This is by no means a new observation. I would remark that $\frac{1}{3}$ of a grain of biniodide per diem is quite a large dose, but I considered it necessary, and it worked in a charming manner.

The only other eye symptom of a specific nature which I need mention is the *parenchymatous inflammation of the cornea*, which is due to congenital syphilis. This generally comes on in childhood, or at the age of puberty. It is sometimes called "serofulous keratitis," but I prefer to consider it a result of a congenital syphilitic contamination. It is generally combined with a notched condition of the front teeth (Hutchinson). These two symptoms may be the only ones which help in the diagnosis, and are, therefore, of great interest to the general practitioner. So much for syphilitic eye disease.

Asthenopia.—There is another condition of the eyes, the result of a local affection, which, if not understood, will completely baffle all attempts at relief. In fact, unless the physician recognizes it, all of his medication would be worse than useless. I refer to asthenopia from some anomaly of refraction (great pain in the eyes and head, due to far-sightedness or other abnormal refractive condition of the eye). I remember the case of one of our most talented physicians of this city, one with a very large, general practice, and a professor in one of our medical colleges, who was absolutely incapacitated for work by such a condition of his eyes. He was a perfect slave for years to a most excruciating kind of headache, having had to lie in bed for days at a time. The peculiarity of the condition is, that a person so affected can see perfectly well in the distance, and also near objects, for a short time; and, if his attention is not specially called to his eyes, he may never know that they are at fault, as was the case with this patient.

All medication for the intense headache of these subjects will be perfectly useless, unless the eye trouble is done away with by making the patient use the proper glasses. He must be tried and suited with biconvex spherical glasses, and if the glasses have been well chosen, all of the subjective symptoms will disappear as if by magic.

This is purely an eye trouble which may completely mislead in making a diagnosis; and also one which can always be completely cured by the proper treatment. If there is no specialist at hand, the patient may pick out such glasses for himself as will give him *the most relief when reading for a long time.*

There is another kind of asthenopia (pain in the eyes and head from muscular fatigue) which, however, demands the intervention of an oculist. This is where one of the internal recti muscles is by nature not strong enough to do the constant work required of it when the two eyes are focused to a near point. The muscle, being too weak, becomes tired, and pain occurs in the eyes, or the eye to which the muscle belongs turns outward, when the patient will see double. This is either to be corrected with *prismatic* glasses, or by an operation; but this particular condition requires the greatest nicety in treatment, so that the patient had better be sent at once to a specialist.

Uterine Diseases.—There is a large class of diseases of the urino-genital organs which produce changes in the eyes, and in some cases may be the only symptoms which the physician can make out without examining the uterus. In fact their presence may point out the uterine trouble.

Only the day before yesterday I was asked to see a young lady in the practice of Dr. Bagley, of this city, which may be interesting to relate in this connection.

The girl was a Hungarian, and, as before stated, 19 years of age; strongly developed, and apparently the picture of health.

She said she had menstruated but twice in her life and in these times her physiological hemorrhage only lasted a half week. This occurred about two years ago; but since that time she was made very miserable every month for a few days, suffering from *most intense headache, combined with anaesthesia of her arms and legs.* For the last three monthly exacerbations she had had an attack of facial erysipelas which lasted about one week each time. She stated that her face got very hot and red, the headache being in the back of her head. At these times she would get completely blind for minutes at a time, the blind attacks coming on many times every day. The light was not particularly disagreeable to her, nor did she suffer any great pain in her eyes.

Of course such symptoms would have led me to make an examination of her sexual organs, but this had already been done by Dr. Bagley. The vagina was completely closed by a membranous septum across the external orifice just behind the labia minora. This septum was continuous, so that if there had been an external flow (as she said there had been twice in her life) such a thing was now impossible, since there was no perforation for the escape of the menstrual fluid.

The probability is that this woman has been menstruating regularly, but the blood has been retained in the vagina and uterus. She said that she had at times all kinds of pains and cramps about the lower part of the abdomen. An operation was agreed upon as is usual in such cases, but since it has not yet been done, we cannot say whether the eye symptoms were brought about simply by a retention of the blood or by an organic disease.

Mooren, of Düsseldorf, explains such cases as the result of engorgement of the uterine plexus, the plexus pampiniformis, and also the same condition of venous system of the ovaries, in fact, of all the pelvic venous vessels. Through their intimate and direct communication with the veins of the spinal column, this pathological condition is extended to the cerebral sinuses, where it produces a great variety of complex symptoms.

The pain in the head and face is to be explained by an irritation of the roots of the trigeminus; and the blindness by disturbances in the cortex of the occipital lobes where there are centres of vision according to many observers. The sight was good, and she had no special hyperaesthesia of the retina. Generally the eyes do not escape so easily; since, according to Mooren, a uterine trouble may produce an inflammatory process of any part of the eyes, or even lead to blindness from atrophy of the optic nerve.

This case would not have been of material advantage to a practitioner as far as the eye symptoms are concerned, since the uterine system was so clearly at fault that his attention would have been at once called to it, as was the physician's who had charge of the patient.

Not so with the next case. A woman came to my office about six weeks ago (April 18th, 1882), complaining of her eyes. She was of English extraction, of 35 years, had had two children, the youngest of which was 8 years old. She said that she could not see as well as she used to, and wanted me to select a pair of glasses for her. Her sight was reduced to about one-half of what it should be. She was near-sighted,

but I could not bring her sight up to the normal by any simple glass or combination of glasses. (No astigmatism.) I then examined her retina and optic nerves with the ophthalmoscope and found that she had a hyperæmia of the background of the eye. The optic papilla (nerve entrance) was pink and its edges were slightly ill defined. I then asked her about her menstruation, and she told me that she had been irregular since she could remember, sometimes menstruating for two days and sometimes for a whole week. Again, her periods were irregular, frequently leaving five or six weeks between them.

I told her that no local medication would do her eyes any good until the uterus was put into proper working order, and advised her to consult a gynaecologist.

The pain, however, which is sometimes concomitant may entirely mislead the physician, unless he happens to examine the eyes. Such an ophthalmoscopic examination would be of great importance to a general practitioner, since the lady did not complain of her uterus; simply considering her irregularity as the penalty of being a woman. Mooren, having treated over one hundred thousand eye cases, has probably as much or more experience in eye troubles than any other living specialist. He has recently written a paper of some sixty pages, in the *Archives of Ophthalmology*, on the eye diseases in connection with uterine troubles. He cites a multitude of cases in which an examination of the eye led him to make a diagnosis of disease of the uterine system, some of them only complaining of their eye trouble. According to this paper all kinds of pelvic diseases can influence the brain directly and the eyes indirectly, from a simple parametritis to all forms of tumours of the uterus, and even prolapse of the rectum.

To demonstrate more fully the intimate connection of the uterine function with the condition of the eyes, this author gives cases of operations upon the eyes, which had gone without irritation for as long as fourteen days, when irritation immediately set in on the advent of a purely physiological menstruation.

He also gives illustrations where simple pustules on the outer genital organs, having extended to the mucous membrane of the vagina, produced hyperæsthesia of the retina, and great photophobia. Again, the simple introduction of a vaginal speculum, and its analogue masturbation, caused the same symptoms. In fact, any uterine irritation may cause a complex of eye symptoms which will completely baffle all the efforts of the physician to cure the eye disease, unless the uterus and its functions have been previously restored to their normal condition.

A complication of the eyes from uterine anomalies is very easily explained by the direct communication of the venous plexuses with the sinuses of the brain; but there are also reflex conditions in the eyes which we cannot account for with our present knowledge of physiology. At any rate, a thorough knowledge of the extent to which the eyes and their disease may be influenced by diseases of uterus and ovaries is indispensable